

Janes, Debra - MSHA

From: Zeiler, Linda F - MSHA
Sent: Tuesday, May 29, 2007 2:21 PM
To: Janes, Debra - MSHA
Subject: FW: Global Fire Testing

[For the TSP record](#)

-----Original Message-----

From: Jan Mutmanský [mailto:mutmansk@ems.psu.edu]
Sent: Friday, May 25, 2007 2:51 PM
To: felipe.calizaya@mines.utah.edu; J. Weeks; Jerry Tien; jbrune@cdc.gov; jweeks@atlintl.com; tom.mucho-TMA@comcast.net; Zeiler, Linda F - MSHA
Subject: FW: Global Fire Testing

[Dear Panel Members,](#)

[Attached please find a compilation of worldwide belt testing standards compiled by Tong Wang and Geoff Normanton of Fenner Dunlop. I thought it would be helpful, particularly to those of you who are on the Belt Characteristics Subcommittee.](#)

[Best wishes as you start your thinking about our task ahead.](#)

[Jan M.](#)

From: geoff.normanton@fennerdunlop.com [mailto:geoff.normanton@fennerdunlop.com]
Sent: Friday, May 25, 2007 1:43 PM
To: j93@psu.edu
Subject: Global Fire Testing

Jan,

Reference our discussions at the Salt Lake meeting, please find the Fenner Dunlop comparison of test standards covering our main areas of manufacturing activity.

Best Regards

Geoff Normanton
Vice President Technology
Fenner Dunlop Americas
Tel: 404 297 3081
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6/1/2007

A Comparison of Worldwide Safety Test Standards

By Tong Wang and Geoff Normanton April 2007 version 2

1. Safety test standards include:

Part 1. Drum Friction Test

Part 2. Laboratory Flame Test (Small Burner)

Part 3. Gallery Flame Test (Fire Propagation Test)

Part 4. Electrical Resistance Test

2. Countries and regions:

Australia; Canada; China

Europe; India; South Africa; USA

This information is to be used as a guide only and is correct to the best of our knowledge at the time of writing. Please refer to the individual standards before using in test work or reference.

Part 1

Drum Friction Test

April 2007

Country & Test Reference	Width of sample (mm)	Drum Diameter (mm)	r.p.m	Peripheral speed		Area of drum contact		Tension			Time	Ambient conditions	Max drum temp	Remarks
				m/sec	ft/min	in ²	cm ²	N	lbf	kgf				
AUSTRALIA AS4606/AS1332 2000 AS1334.11 1988	150±1	212.8±0.3	190	2.12 +/- 0.05	417	77	501	343	77	35	To destruction or 2 hrs max.	6 tests: 3 in still air & 3 in air current (2.0m/sec)	325°C	Should not exceed max. temp., or no visible flaming or glowing
CANADA CAN/CSA M422-M87 1995	150±2	210±2	195±10	2.2	433	77	495	343 686 1029 1372 1715	77 154 251 308 386	35 70 105 140 175	60 mins +30 mins +30 mins +30 mins +30 mins	Type A1: 4 pieces tested: 2 tests each side in still & moving air 2.5 +/- 0.1 m/s	325°C	No flame or glow Max. temp<325°C; Belting shall part in 3 hrs
								343	77	35	3 hrs	Type A2: 4 pieces tested:2 tests each side in still & moving air	325 °C	No flame or glow Max. temp<325°C; Belting shall not part during 3 hrs testing period
								343	77	35	3 hrs	Type B1-A & B1-B: 2 pieces tested: 1 test each side in still air	400 °C	No flame or glow B1-A, B1B no Flame Max. temp<400°C; Belting shall part in 3 hrs
								343	77	35	3 hrs	Type B2: 2 pieces tested:1 test each side in still air	400 °C	No flame or glow; Max. temp<400°C; Belting shall not part during 3 hrs testing period
								343	77	35	3 hrs	Type C: 2 pieces tested;1 test each side in still air	400°C	No flame or glow; Max. temp<400°C
CHINA MT914 2002	150	210±1	200±5	2.2	433	77	495	343 686 1029 1372 1715	77 154 231 308 386	35 70 105 140 173	60 mins +30 mins +30 mins +30 mins To destruction	6 pieces tested: each side in still air & in air current (2.0±0.1m/s). Worst result repeated	325 °C	No flame or glow; Max. temp< 325°C
EUROPE EN14973 2006 EN 1554 1998	150	210±1	200±5	2.2	433	77	495	343 686 1029 1372 1715	77 154 231 308 386	35 70 105 140 173	60 mins +30 mins +30 mins +10 mins To destruction	6 tests, 3 in still air & 3 in air current (2.0±0.1m/s);	No Limit or 450°C or 325°C	Class A, B2&C2: no flame only; No Max temp Class B1: no flame or glow; Max. temp. <450°C; Class C1: no flame or glow; Max. temp. <325°C.

Part 1
Drum Friction Test
April 2007

Country & Test Reference	Width of sample (mm)	Drum Diameter (mm)	r.p.m	Peripheral speed		Area of drum contact		Tension			Time	Ambient conditions	Max drum temp	Remarks
				m/sec	ft/min	in ²	cm ²	N	lbf	kgf				
INDIA IS3181 1992	150	210±1	200±5	2.2	433	77	495	343 686 1029 1372 1715	77 154 231 308 386	35 70 105 140 173	60 mins +30 mins +30 mins +10 mins To destruction	Equal covers, 4 tests, 2 in still air & 2 in air current (2.0±0.1m/sec)	325°C	Sample fails if there is any flame, glow or max temp is exceeded. For belts with unequal covers, four further tests are conducted, 2 in still air & 2 in moving air using the cover to the drum which gave the worst result in the original 4 tests
SOUTH AFRICA SABS971 2003	225	450	110±10	2.6	512	280	1591			22.5 34 45.5 59.5 75.5 91.5 107.5 123.5	15 mins +15 mins +15 mins +15 mins +15 mins +15 mins +15 mins +15 mins	2 pieces tested, 1 test each side in moving air 90 +/- 3 m/min		Must not show any sign of flame or glow

Part 2
Laboratory Flame Test (Small Burner)
April 2007

Country & Test Reference	No & Size of test pieces	Allocation of test pieces from sample	Orientation /cover Detail	Time in Flame	Air conditions after removal of flame	Aggregate time allowed for flame or glow for each set	Average time allowed for flame or glow for each set	Maximum time allowed for any one test piece	Remarks
AUSTRALIA AS4606/AS1332 2000 AS1334.10 1994	10 150 mm×13 mm	5 from warp 5 from weft	covers on	60 s	Still air until flame extinguished then turn on air current @ 1.5 +/- 1.5 m/s	Grade S Grade F	10 s flame 30 s flame /120s glow	15 s flame 45 s flame / 180 s glow	Approval test only requires 10 samples Propane Burner
	10 150 mm×13 mm	5 from warp 5 from weft	covers off	60 s		Grade S	15 s flame	25 s flame	
CANADA CAN/CSA M422-M87 1995	8 150mm×12.5mm	4 from warp 4 from weft	covers on	60 s	Still air	Type A1&A2	40 s flame 120 s glow	Not applicable	Burner is Pittsburgh-University Bunsen type using technical grade or better methane
			covers on			Type B1-A,B1-B & B2: Type C	60 s flame 180 s glow 60 s flame No limit on glow	Not applicable Not applicable	
CHINA MT914 2002	24 150mm×25 mm	3 from warp & 3 from weft	covers on	30 s	Still air	18 s	3 s	10 s	Spirit burner is used.
		9 from warp & 9 from weft	covers off	30 s	Still air	45 s	5 s	15 s	
EUROPE EN14973 2006 EM12882 2002 EN ISO 340:2004	6 200 mm×25 mm	3 from warp 3 from weft	covers on	45 s	Still air	A, B1, B2 & C2: 45s	A, B1, B2 & C2: 7.5s	15 s	There must be no appearance or reappearance of flame or glow when test piece is subject to air flow 60 s after removal from flame.
	6 200 mm×25 mm	3 from warp 3 from weft	covers off	45 s	Still air	C1: cover on:18s cover off: 30s	C1 cover on 3 s C1 Cover off 5s	10 s 15 s	
INDIA IS3181 1992	6 150mm×25 mm	3 from warp 3 from weft	covers on	30 s	Still air	18 s	3 s	10 s	If one piece flames or glows for over 10 s, but average is within spec, a further 6 pieces are to be tested. If one piece flames or glows for over 15 s, but average is within spec, a further 6 pieces are to be tested
	6 150mm×25 mm	3 from warp 3 from weft	covers off	30 s	Still air	30 s	5 s	15 s	
SOUTH AFRICA SABS971 2003	6 200 mm×25 mm	3 from warp 3 from weft	covers on	45 s	Still air	45 s	7.5 s	15 s	There must be no appearance or reappearance of flame or glow when test piece is subject to an air flow 60 s after removal from flame.
	6 200 mm×25 mm	3 from warp 3 from weft	covers off	45 s	Still air	45 s	7.5 s	15 s	
USA 30CFR18.65 1978	4 6 ins×0.5 ins (152.4×12.7mm)	2 from warp 2 from weft	covers on	60 s	300 ft/min		1 min flame: 3mins afterglow:		Burner is Pittsburgh-University Bunsen type

Part 3

Gallery Flame Test (Fire Propagation Test)

April 2007

Country & Test Reference	Dimension of gallery	Air speed (m/s)	Sample size	No. of Samples	Test Conditions				Conditions of Acceptance
					Test Time	Fuel			
						Type	Consumption	Pressure (MPa)	
AUSTRALIA AS4606/AS1332 2000 AS1334.12 1996	2.4 m high 2.5 m wide	1.5±0.1	Length : 2000mm Width: 1050 ~ 1200 mm Samples have simulated cover damage	2 for belts equal cover thickness 3 for belts of unequal cover thickness	Remove burner after 10 mins	Propane	1.3 +/- 0.05 kg	0.2	The length of remaining undamaged over the full width shall exceed 250 mm
CANADA CAN/CSA M422-M87 1995	2m high 2 m wide	1.5±0.2	Length: 4 m Width: 900 mm	2 Conduct testing on both sides	Type A1&A2: 0.1 min for each 0.1 mm of belt thickness (10mm min) Type B1-A, B1-B & B2: 10 mins	Propane	130±5 g/min		A full width piece shall remain substantially undamaged If any test is terminated prematurely due to the exhaust gases exceeding 200 °C, the belting shall be deemed to have failed
CHINA MT914 2002 A. Normal gallery B. Higher energy	2 m high 2 m wide	1.5±0.1	Type <1250 S, 800 mm wide Type >1250 S, 1000 mm 2 m long	2 Conduct testing on both sides	Remove burner after 10 mins	Propane	1.3 +/- 0.05 kg	0.16	The length of remaining undamaged over the full width shall exceed 250 mm
			Type <1250 S, 800 mm wide >1250 S, 1000 mm wide 4 m long		Remove burner after 50 mins		7.5 +/- 0.25 kg	0.2	The length of remaining undamaged over the full width shall exceed 2250 mm
EUROPE EN14973 2006 EN12881-1 2005 EM12882 2002 A: Single burner B: Double burners C: Mid scale	1.9~2.25 m high 1.9~2.75 m wide 0.46X0.46m	1.5±0.1 1.5±0.1 1.0±0.05	Width:1.2 m; Length: 2 m Width: 1.2m Length: 2.5m Width: 0.23m; Length: 1.5m	A&B: 2 (conduct testing on both sides) C. 2 pieces for belts equal cover thickness 3 pieces for belts of unequal cover thickness (3 rd test conducted on side down giving worst result)	A: Remove burner after 10 mins B: Remove burner after 20 mins C: Remove burner after 50 mins	Propane	A:(130±5) g/min B:(130±5) g/min C:(11.3±0.2) g/min	0.16 0.16	A: Length(remaining undamaged over the full width)> 100 mm; B: Some undamaged belt left C. Length (remaining undamaged over the full width) > 600 mm or length consumed by mass>1250mm + max. temp. <140°C
INDIA IS3181 1992	2 m high 2 m wide	1.5±0.1	Length: 2m Width: 900 mm for belts up to & incl1140 kN/m 1050 mm for belts >1140 N/m	2 pieces for belts equal cover thickness 3 pieces for belts of unequal cover thickness (3 rd test conducted on worse side down)	Remove burner after 10mins	Propane	1.3±0.05 kg	0.158	When all combustion has ceased, there must be a minimum of 250 mm remaining undamaged.

Part 4

Electrical Resistance Test

April 2007

Country & Test Reference	No. of Tests	Sample size	Current applied to electrodes	Sample conditions	Electrode dimensions	Composition of electrodes	Contact agent	Base sheet	Conditions of Acceptance
AUSTRALIA AS4606/AS1332 2000 AS1334.9 1982	4 (2/side)	No less than 300 mm × 300 mm	40 to 1000 V d.c energy loss< 1W	> 2 hrs at 23°C&70% RH	2 electrodes: a. cylinder 25 mm dia.×32mm high; b. Annular ring: Internal dia.: 125 mm; External dia.: 150 mm; Height: 22 mm	Brass	Anhydrous polyethylene glycol, soft soap & water	An insulating sheet a little larger than sample & no less than 1.5 mm thick	< 300 MΩ
CANADA CAN/CSA M422-M87 1995	4 (2/side)	300 mm × 300 mm	energy loss< 1W	>2 hrs at 20±2 °C& 50±5 % RH	As above	Brass	As above	An insulating sheet a little larger than sample	< 300 MΩ
CHINA MT914 2002	6 (3/side)	No less than 300 mm × 300 mm	50 to 500 V d.c. energy loss< 1W	>24 hrs at 23±2 °C& 65±5 % RH	As above	Brass	As above	As above	< 300 MΩ
EUROPE EN1497 2006 EM1288 2002 EN ISO 284:2003	4 (2/side)	No less than 300 mm × 300 mm	40 to 1000 V d.c energy loss< 1W	> 2 hrs 23±2 °C & 50±5 % RH; For belt with textile carcass: 20±2 °C & 65±5 % RH In tropical condition: 27±2 °C & 65±5 % RH	As above	Brass	As above	As above	< 300 MΩ
INDIA IS3181 1992	4 (2/side)	No less than 300 mm × 300 mm	40 to 1000 v d.c energy loss< 1W	2 hrs at 27±2 °C&65±5 % RH	As above	Brass Note: additional tin foil electrodes may be used if surface is insufficiently smooth	As above	Polyethylene sheet >2 mm thick & 300 mm × 300 mm	< 300 MΩ
SOUTH AFRICA SABS971 2003	4 (2/side)	No less than 300 mm × 300 mm	40 to 1000 V d.c energy loss< 1W	As in Europe	As above	Brass	As above	An insulating sheet a little larger than sample	< 300 MΩ